Q & A

Distributed Energy Road Show

Madison, WI
May 8, 2003

DE: National Perspective

Q: What does PEM stand for?
A: Proton Exchange Membrane – PEM fuel cells have the lowest operating temperature of any fuel cell.

Q: What is so unusual about the fuel cell certification process you used as your example? Most of the requirements are standard, and I am surprised you are treating them as unusual.
A: We are letting people know what has happened in the past so that end-users are aware of what they need to consider. Since codes and standards are under development, people need to plan for situations like this.

Stirling Engines: Installation and Operation

Q: What is the temperature of the hot water?
A: Up to 65 degrees Celsius, which is about 150 degrees Fahrenheit. Anything higher limits the life of the engine and reduces power output and efficiency. (The temperature can be adjusted by the customer.)

Q: Do you do anything to treat biogas fuel that you use on your example?
A: There is a watertrap on the system. The gas is 140 degrees Fahrenheit. There are individual small moisture traps on each system that are warmed.

Q: What is the pressure of the gas?
A: Plus or minus 2 psi. Natural gas is 315 cfm.

Q: What about impurities in gas fuels?
A: There are no issues with siloxane.

Q: This is a burner technology, not an internal combustion engine, right?
A: Exactly.

Q: How do you project maintenance costs?

A: We do so at 5,000-hour intervals. At 5,000 hours we check the belt to make sure it is okay, and we replace the air filter. At 20,000 and 40,000 hours we change the pistons and seals.

Q: How long did it take to get your Oregon unit installed?
A: It took about three months to get through the regulations and certifications.

Q: What is the price per kilowatt-hour?
A: It's less than $1,000 per kWh in CHP mode.

Q: Do you have any Wisconsin installations?
A: In the next couple weeks a project will start at Allaint World headquarters in Madison – it should be running within a couple months.

Q: Why hasn't this technology been commercialized yet?
A: Other companies have experienced road blocks – some tried to hard to make it for automotive applications. They ended up not being cost effective for automobiles.

Q: Have you experienced any road blocks with the Wisconsin installation?
A We haven't gotten to that part of the process yet, so no. This will be an Alliant-owned unit, which will be interconnected to Alliant's distribution system, so there will probably be few or no interconnection delays. The fuel will be natural gas, and that is a familiar fuel, so there should be no safety delays with the fueling system. It will be an outside installation, so building codes shouldn't be too cumbersome.

Interconnection has been our biggest hurdle, but General Electric is making a plug-and-play interconnection device for the unit that should help alleviate delays.

Q: Doe the gas have to be a certain temperature?
A: No, it doesn't matter. For example, our Michigan unit uses biogas, which contains a lot of moisture and temperatures are below freezing for several months of the year. The engine requires an extra water trap and extra heat tape, and that's it.

Q: Do these units work only in grid-connected applications?
A: Our betas are all grid-parallel. The 250kW unit can be dual-mode, grid-independent, or grid-connected. The customer can choose a package based on their needs.

Q: What makes the engine so clean?
A: The combustion process is continuous. The combustion nozzle emits low NOx—there are no unburned hydrocarbons. The intermittent combustion is much slower and has numerous nozzles designed to burn everything.

Microturbines: Installation and Operation

Q: What is the duration time for voltage outages—is the turbine programmed for tripping off?
A: A half a second – 20% power loss.

Q: Why did Milwaukee choose a microturbine for its DG installation?
A: They needed backup power and decided to select an efficient system that could also provide baseload power.

Q: What are the grounding requirements?
A: Number 6 copper wire to the ground – one point only.

Q: Can microturbines be used for mobile applications – for example, for seasonal industries such as canning or food processing?
A: Yes – units can be placed on a skid and moved around. The City of Milwaukee has asked for a skid-mounted unit, and so has Alliant Energy.

Q: What is the cost of a microturbine compared to a diesel genset?
A: A microturbine costs more – up to $3,000 per kW, but microturbines have much lower maintenance costs. When doing an economic analysis, it is important to consider the up front and longer-term costs. A genset probably costs about 60% less than a microturbine. Other benefits that microturbines offer are less noise and fewer air issues.

Q: What is the noise level?
A: A running microturbine makes a humming sound. With heat recovery, it is muffled. Sometimes you don't even hear them running. There is an 8-unit set that you don't even hear from 50 yards away – it is a high frequency noise.

Q: Are microturbines good for emergency back up applications?
A: That is not the most ideal use for microturbines. If a microturbine is operating in dual mode and there is a power outage, it will need to shut down and then start back up, which takes about 2 minutes. Some city codes require emergency back up units to have a 10-second or less switch mode, so a microturbine wouldn't qualify as emergency standby for those areas. It is more of a software limitation than a hardware issue, and Capstone is working on this.

Q: How long does a microturbine take to start up once you turn it on?
A: 30 seconds.

Photovoltaics: Installation and Operation

Q: What type of PV units are installed here at the Madison Area Technical College?
A: They are both grid-tied systems. The panels could power 20 computers for 10 hours a day, seven days a week. Students and teachers can monitor the output.

Q: What are the paybacks?
A: They are directly related to the facility's energy efficiency. Installation is about $10/watt. Over the life of the system that would probably average about an 8 to 10 cent electricity rate.

Comment: That is an economic payback, but environmental paybacks are extensive. If economics is all you care about, don't do it. The benefits are educational, ethical and environmental.

Comment: Think of buying a PV system as buying a car and all of its fuel up front. With automotive fuel costs spread out over the life of the vehicle, people don't realize how much it adds up to.

Comment: Another benefit of solar is that the output is coincident with when we need power the most.

Overview of PSC 119 Rules

Q: When you say "utility" does this include coops?
A: The law includes all utilities except coops. However, coops have provided input and we hope they voluntarily follow the rules. Very small munis would probably work with larger ones for getting one designated contact for DG interconnection.

Q: What do the engineering review fees cover?
A: Analysis of the distribution system.

Q: Is this based on the cost to the customer, and who hires the engineer?
A: The engineering review is conducted by the utility and paid for by the customer.

Q: In really small service territories, the utilities and munis don't want renewable energy installations connected to their grids.
A: Under PURPA, they have to connect a qualifying facility

Q: How much time does a user have to decide whether to install the unit after an engineering review is conducted?

A: The cost estimates from utilities are good for one year – this gives the DG customer time to decide to move forward on the project.

Q: Under the USDA grant, a user must have a letter from the utility saying they will interconnect – during which part of the process would this take place?
A: During Step 6: Go/No-go decision. Or the utility might be approached in advance before a user goes through all the steps before Step 6. The utility still wouldn't be able to *guarantee* the interconnection, because they would still need to go through this process, though.

Q: What is the exact language regarding the PSC 119 requirements for a visible interconnection disconnection switch?
A: The rule says "the utility *may* require…"

Q: Is this a standard modeled after IEEE?
A: It references IEEE.

Q: Is DOE creating national standards?
A: No, IEEE is a national standard that DOE is helping to develop through leadership. DOE does not create standards on its own.

Q: When is the interconnection agreement signed?
A: After installation but before interconnection. The "Purchase Power Agreement" is signed when the contract goes into effect and may help with financing.

Q: Can you explain "type tested" in the last slide?
A: It depends on whether the UL standard applies to that size. If the equipment has a UL label, the utility cannot require further testing—if it has a UL sticker, it has already been type tested.

Wisconsin Technical and Financial Assistance Programs

Q: Who is eligible for incentive awards?
A: In the Focus territory, all IOU's and coops –check our web site for eligibility tools.

Q: How has competition for awards been?
A: If someone writes a viable proposal, they have a pretty good chance of receiving an award. We give feedback to applicants who don't win an award and let them re-apply.

Q: Can I apply now to receive a July 2003 award?
A: Yes. But we evaluate applications on a month-to-month basis, so it's not a one-time shot.

Q: What is the time line for wind resource evaluations?
A: That is to be determined. We're going to determine the priority areas and try to get portable wind assessors for 6-month assessments.

Structured Discussion

Comment: To get more participation from code inspectors or fire marshals, it might be a good idea to pair up with one of their conferences. Inspectors contract with municipalities, towns, and cities, and mayors and/or supervisors can require them to attend meetings/trainings.

Comment: When the final interconnection rules are in place, we could use some resources to get code officials to attend another road show – offer CECs.

Comment: Another group to target for Wisconsin road shows (possible end-user) would be the cheese makers association. Having a workshop that focuses on applications would be helpful also.

Comment: If we could make training CDs or videos that would be another way to reach out to inspectors to educate them about DG.

Comment: Benefits in Wisconsin in the agriculture sector haven't been addressed—especially regarding the dairy industry. We get mixed messages from the federal government—the Farm Bill, the costs of proposals, which are huge hurdles. There are not sufficient incentives to get people to submit proposals. Tax credits and other supportive drivers are needed.

Comment: This was a really informative workshop – the grants information was helpful. Great presentations.